CELWAVE RFS

DIVISION OF RADIO FREQUENCY SYSTEMS

INSTRUCTION MANUAL

MODEL NO. ARX140PK

SERIAL NO. 328574-A

115 EAST WATKINS PHOENIX, ARIZONA 85004-2925

TEL.: (602) 252-8058 TWX: 910-951-4220

LIMITED WARRANTY

The Seller warrants that, at time of shipment, the products manufactured by the Seller are free from defects in material and workmanship. The Seller's obligation under this warranty is limited to replacement or repair of such products within one year from the date of shipment. No material is accepted for replacement or repair without written authority of the Seller. Replacement or repair is made only after an examination at the Seller's plant shows defective material or workmanship at the time of manufacture. All shipping charges on the returned material must be prepaid by the Buyer.

Seller is in no event liable for consequential damages, installation cost or other costs of any nature as a result of the use of the products manufactured by the Seller, whether used in accordance with instructions or not. The Seller is not liable for replacement of any antenna damaged by lightning.

This warranty is in lieu of all others, either expressed or implied. No representative is authorized to assume for the Seller any other liability in connection with the Seller's products.

CELWAVE RFS
DIVISION OF RADIO FREQUENCY SYSTEMS

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Instructions For 220 MHz Duplexed Trunking System
Celwave No. 719110
Manual No.74372

This system consists of a TJD220-5T trunking combiner,duplexer,2-pole receive filter, and a receiver multicoupler. The attached drawing shows a block diagram and rear view of the assembled system. The Rx portion of the duplexer consists of six PD1604B cavities used as resonators mounted on a 15 3/4" x 19" panel. The 2-pole filter consists of two PD1604B cavities on a 7" x 19" panel. The Tx portion of the duplexer also consists of six PD1604B cavities on a 15 3/4" x 19" panel. The RMC tray consists of an amplifier, power divider, and power supply. The transmitter combiner is a dual isolator, five channel unit.

Instruction manuals for the combiner, duplexer, filter, and receiver multicoupler are included with this manual. The open relay rack is 68" high inside dimensions. The 2-pole filter has an average loss of 0.6 dB. The duplexer loss ranges from about 1.9 dB at 221 MHz to 0.8 dB at 221.6 MHz. The system gain including cables ranges from +3.5 dB at 221 MHz to +4.9 dB at 221.6 MHz. The system noise figure is near 6 dB at 221 MHz.

These frequencies are typical of a Tx passband of 220.0 - 220.6 MHz. The available Tx range is 220.0 to 220.7 MHz, in a 600 kHz bandwidth. The attached drawing shows the relation between components mounted in the relay rack. All cables are of critical length. The system does not require any adjustments. If the duplexer should require any adjustments, however, consult the factory for assistance. The duplexer harness, Celwave # 692760, connecting the Rx and the Tx sections of the duplexer, can be removed if a non-duplexed version of the system is desired. The system should not require any retuning after harness removal.

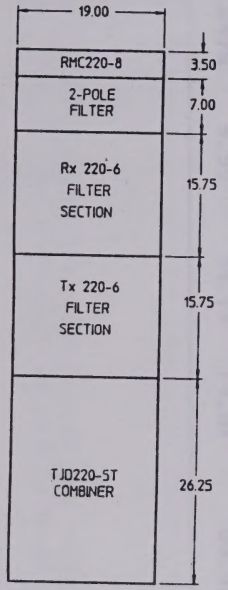
This manual includes drawing no. B-71911.

SUPPLEMENTARY INSTUCTIONS
FOR 220 MHz
DUPLEXED TRUNKING SYSTEM
DATE:8-26-93

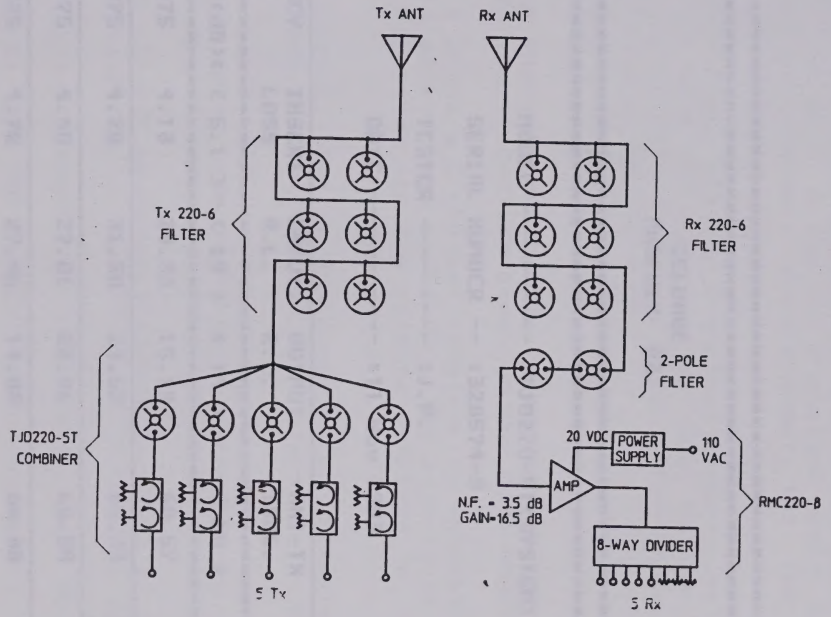
The duplexer harness ,CELWAVE # 692760, connecting the TX and RX sections of the DPX220-12 duplexer, can be removed if a non-duplexed version of the system is desired.The system should not require any retuning after removal of the harness. Before removal, mark each cable TX or RX since the cables are critical length. The cable can be reconnected at any time without retuning.

REVISION	
0	

RACK SPACE REQUIREMENTS



ELECTRICAL LAYOUT



SPECIFICATIONS

Tx PASSBAND 220 - 220.6 MHz	
RETURN LOSS (TYP)	> 14 dB
Rx PASSBAND 221 - 221.6 MHz	
RETURN LOSS (TYP)	> 14 dB
SYSTEM NOISE FIGURE	6.8 dB @ 221 MHz
ATTENUATION @ 211.25 MHz	> 48 dB
Rx MULTICOUPLER GAIN	6.0 dB @ 221 MHz
SYSTEM GAIN @ 221 MHz (TYP)	3.6 dB
SYSTEM GAIN @ 221.6 MHz (TYP)	4.7 dB
INSERTION LOSS (TYP)	4.5 dB
INSERTION LOSS (MAX)	5.1 dB @ 220.6 MHz
Tx INPUT RETURN LOSS	> 19 dB
AVERAGE POWER INPUT/CHANNEL	100 WATTS

USED ON

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Unless otherwise specified –

All dimensions are in inches and title block tolerances apply.

All thread dimensions to be met after plating where applicable and are to be gauge checked. Break all sharp edges .010-.015 after finish machining.

All machined surfaces shall be smooth within 63 micro inches.

DIMENSIONAL TOLERANCES		
BASIC	XXX	XX
0"- 6"	± .008	± .01
6"- 24"	± .015	± .02
ALL ANGLES ± 1°		

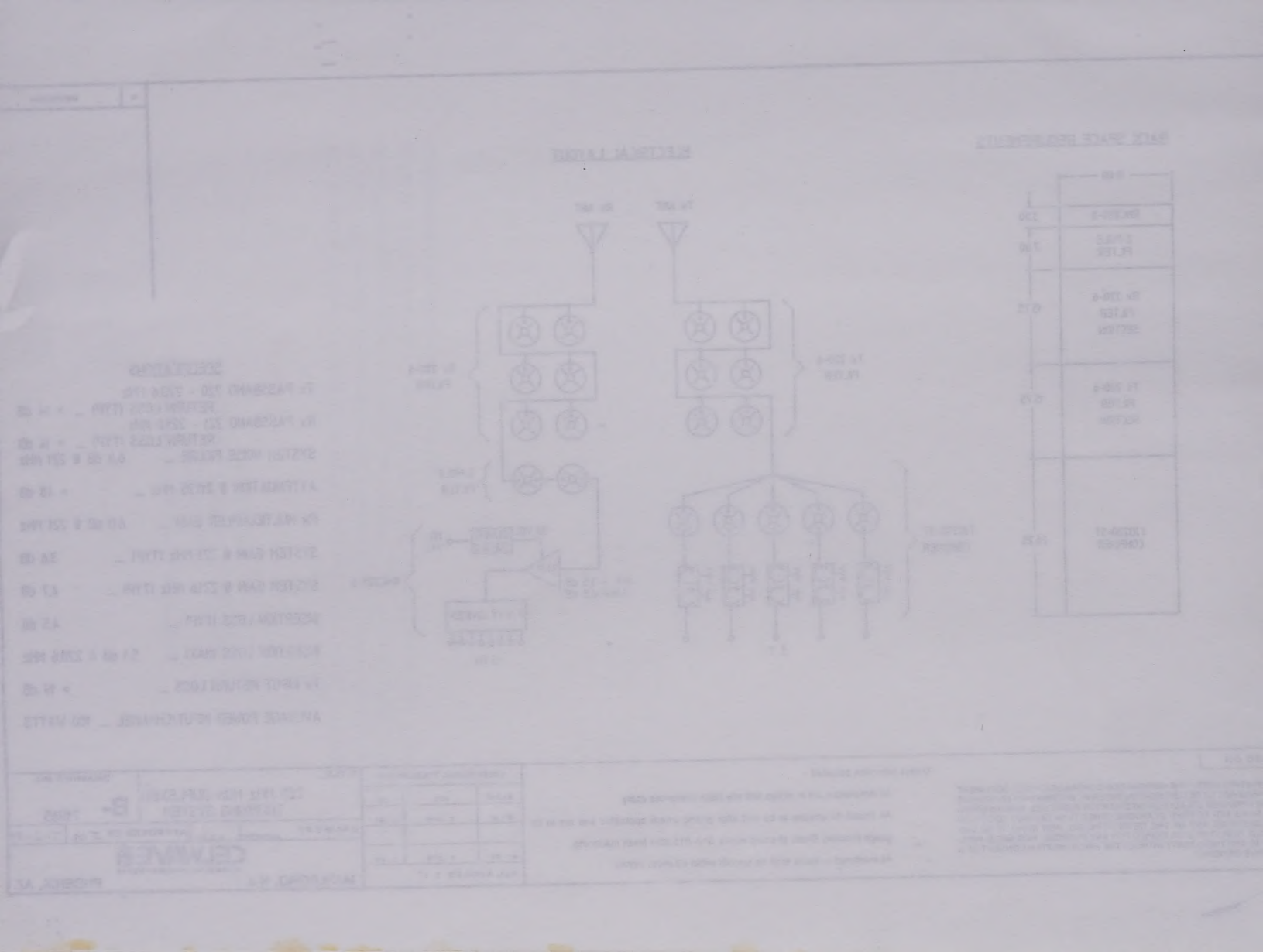
TITLE: 220 MHz NON-DUPLEXED TRUNKING SYSTEM

DRAWING NO. B- 71965

DRAWN BY [illegible] 7.2.93 APPROVED BY JM 7-2-93

CELWAVE DIVISION OF RADIO FREQUENCY SYSTEMS

MARLBORO, N.J. PHOENIX, AZ.



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CELWAVE
PHOENIX AZ.

MODEL ---------- :TJD220-5T(SYSTEM)

SERIAL NUMBER -- :328574-A

TESTER --------- :J.P.

DATE ----------- :11 Nov 1993

NUM	FREQUENCY (MHZ)	INSERT LOSS	INPUT R.L.	OUTPUT R.L.	ANT-TX ISOL.	TX-TX ISOL.
	SPECS (dB):	(5.1)	(19)	(14)	(50)	(60)
1	220.0475	4.13	29.33	15.19	60.57	79.02
2	220.1975	4.20	31.50	24.52	69.33	81.35
3	220.3475	4.40	27.01	23.86	66.58	75.18
4	220.4975	4.78	27.46	14.08	66.88	74.65
5	220.6475	4.99	34.17	14.01	69.07	76.79

CELWAVE
PHOENIX RZ.

MODEL ---------- :TI0220-ST(SYSTEM)

SERIAL NUMBER -- :3285274-A

TESTER --------- :J.P.

DATE ------------ :11 Nov 1993

NUM	FREQUENCY (MHZ)	INSERT LOSS	INPUT R.L.	OUTPUT R.L.	ANT-TX ISOL.	TX-IX ISOL.
SPECS (dB):		< 5.1 >	< 19 >	< 14 >	< 50 >	< 60 >
1	220.0425	4.13	29.33	15.19	60.57	79.02
2	220.1975	4.20	31.50	24.52	69.33	81.35
3	220.3475	4.40	27.01	23.86	66.58	75.18
4	220.4975	4.28	27.46	14.08	66.88	74.85
5	220.6475	4.95	34.17	14.01	69.07	76.79

TJ220 SERIES OF TRANSMITTER COMBINERS
MANUAL NO. 74367

DESCRIPTION

The TJ220 series of transmitter combiners employ a combination of ferrite isolators and cavity resonators to obtain low insertion loss and high isolation between transmitters. This combiner has two isolators per channel and five channels for use in the 220 MHz trunking band. The minimum channel spacing at which this unit is used is 150 kHz at 220 MHz. A typical 5 channel unit has slightly more than 3 dB loss per channel. A data sheet for the unit ordered is included in the manual.

This sheet gives all the insertion losses, isolations, and VSWR's of the combiner when operated into an ideal 50 Ohm load. (If the unit is ordered with an option such as power monitoring, then instructions for that option will be included.)

INITIAL TESTING

The five channel unit can be tested separately if desired to make sure it meets specifications given on the data sheet.

Figure 1 shows a 5 channel combiner in schematic form. The input terminals are marked test point "A", the outputs of the isolators are marked test point "B" and the antenna junction is marked test point "C".

To make power input versus power output measurements to check the insertion losses of the combiner the following is needed:

a. One (1) Bird Model 43 (or equivalent) through line power meter with type "N" connectors, and a plug-in for the appropriate frequency and power level.

b. One (1) 12" measured pin-to-pin length of RG-214 or equivalent with type "N" male connectors attached.

c. Two (2) 4' lengths of RG-214 with Male "N" connectors.

d. One (1) Type "N" double female connector.

e. One (1) 50 Ohm load with 100W or more rating.

Proceed as follows to obtain input and output power readings:

Step 1

Connect the 50 Ohm termination to the output or antenna terminal, test point "C", of the combiner through one of the 4' lengths of RG-214 cable.

Step 2

Connect the Channel 1 transmitter to the connector on the power meter and the other end of the power meter, via the 12" cable, to input terminal 1 (T1) on the combiner.

Step 3

Key the Channel 1 transmitter and note and record the forward power reading on the watt meter.

Step 4

Disconnect the wattmeter from the T1 terminal and connect it, via the 12" lead, to the "ANT" terminal. Connect the 50 Ohm load to the other terminal of the wattmeter, via the 4' cable. Connect the Channel 1 transmitter to the T1 terminal. Key the transmitter and note and record the power output at the "ANT" terminal (test point "C" in diagram). This wattmeter reading should be not much less than half the input reading obtained in Step 3.

Step 5

Repeat steps 1 - 4 for the remaining channels. If the indicated power loss through each of the channels does not exceed 3.8 dB with a 5 channel unit, then the unit is functioning properly. (3.8 dB loss means that 42 of the power is reaching the antenna terminal.) If any of the channels exceed this allowable loss then retuning of the cavities is indicated. See the later section entitled "Retuning Cavities". If the unit has been ordered with frequency spacings less than the recommended minimums (page 1), then a greater loss than 3.8 dB can be expected.

Best performance from this combiner will be obtained if it is operated into an antenna circuit having a return loss of at least 14 dB (1.5:1 VSWR). Verify the VSWR by using a forward/reflected-type of wattmeter of known accuracy. This VSWR is the accepted maximum value for most antenna manufacturers and it is unlikely that a higher value will be encountered. If a higher value is encountered the condition should be corrected, as the efficiency of the combiner can be greatly degraded.

RETUNING CAVITIES

If the initial testing of Steps 1 through Step 5 reveals insertion Losses exceeding those shown on the test data sheet, or if a channel or channels have been shifted in frequency then retuning of the cavities is indicated.

If a spectrum analyzer is available to the testing department, a procedure is described in the attached Supplemental Instructions.

The combiner should now be checked for power transfer per steps 1

through the maximum number of channels. The insertion losses should now agree with those on the data sheet shipped with the unit. If you still cannot obtain the insertion losses quoted in the data sheet, consult the factory for assistance.

This manual includes drawing no(s): A-56743 and plot.

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CELWAVE
PHOENIX AZ.

MODEL ---------- :TJD220-5T

SERIAL NUMBER -- :328574-A

TESTER --------- :RFTB

DATE ----------- : 9 Nov 1993

NUM	FREQUENCY (MHZ)	INSERT LOSS	INPUT R.L.	OUTPUT R.L.	ANT-TX ISOL.	TX-TX ISOL.
	SPECS (dB):	(3.8)	(19)	(14)	(50)	(60)
1	220.0475	3.37	31.81	14.08	59.72	79.26
2	220.1975	3.40	26.79	23.19	69.51	80.46
3	220.3475	3.42	30.66	33.92	66.15	76.06
4	220.4975	3.42	31.12	25.03	65.29	77.17
5	220.6475	3.21	29.15	14.68	66.44	78.56

FINAL INSPECTION
PERFORMED BY:_____

CELLWAVE
PHOENIX AZ.

MODEL ---------- :TLD220-ST

SERIAL NUMBER -- :3285Y4-A

TESTER ---------- :RFTB

DATE ---------- : 9 Nov 1993

NUM	FREQUENCY (MHz)	INSERT LOSS	INPUT R.L.	OUTPUT R.L.	ANT-TX ISOL.	TX-TX ISOL.
SPECS (dB):		< 3.8 >	< 19 >	< 14 >	< 50 >	< 60 >
1	220.0475	3.37	31.81	14.08	59.72	79.26
2	220.1975	3.40	26.79	23.19	69.51	80.46
3	220.3475	3.42	30.66	33.92	66.15	76.06
4	220.4975	3.42	31.12	25.03	65.29	77.17
5	220.6475	3.21	29.15	14.68	66.44	78.56

FINAL INSPECTION
PERFORMED BY:_____

0	REVISION

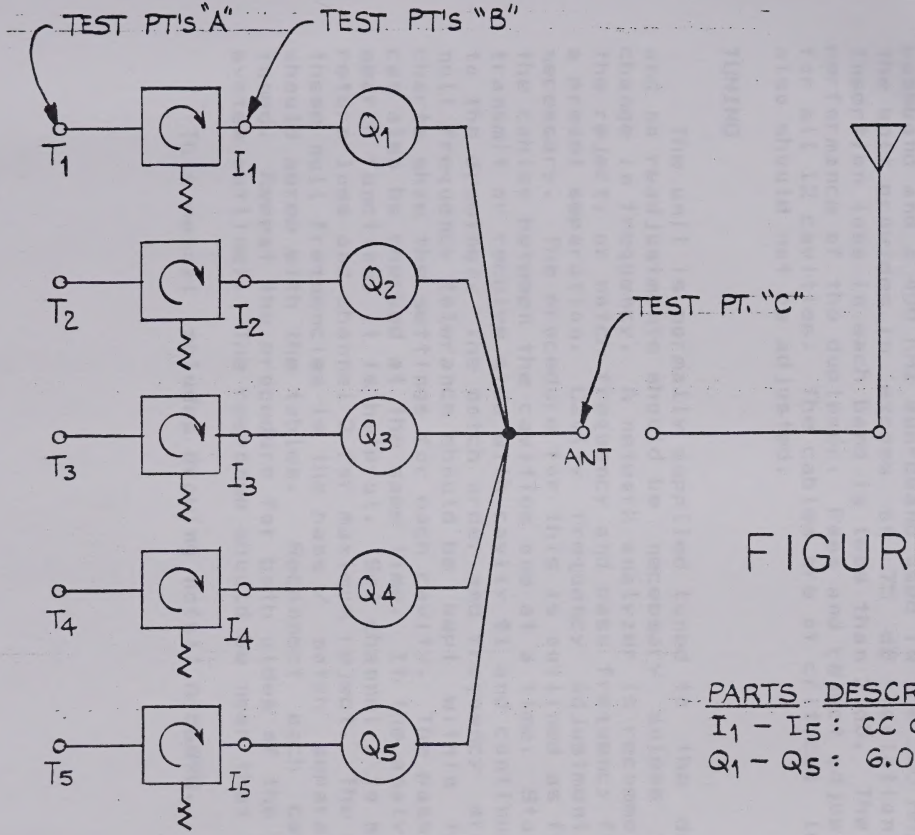

FIGURE 1

PARTS DESCRIPTION:
$I_1 - I_5$: CC OR CD ISOLATORS
$Q_1 - Q_5$: 6.0" RESONATORS

Unless otherwise specified — All dimensions are in inches and title block tolerances apply. All thread dimensions to be met after plating where applicable and are to be gauge checked. Break all sharp edges .010-.015 after finish machining. All machined surfaces shall be smooth within 63 micro inches.

USED ON

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DIMENSIONAL TOLERANCES

BASIC	FRACTIONAL	DECIMAL
0"- 1"	± .010	± .003
1"- 6"	± 1/64	± .005
6"- 24"	± 1/32	± .008

ALL ANGLES ± 1°

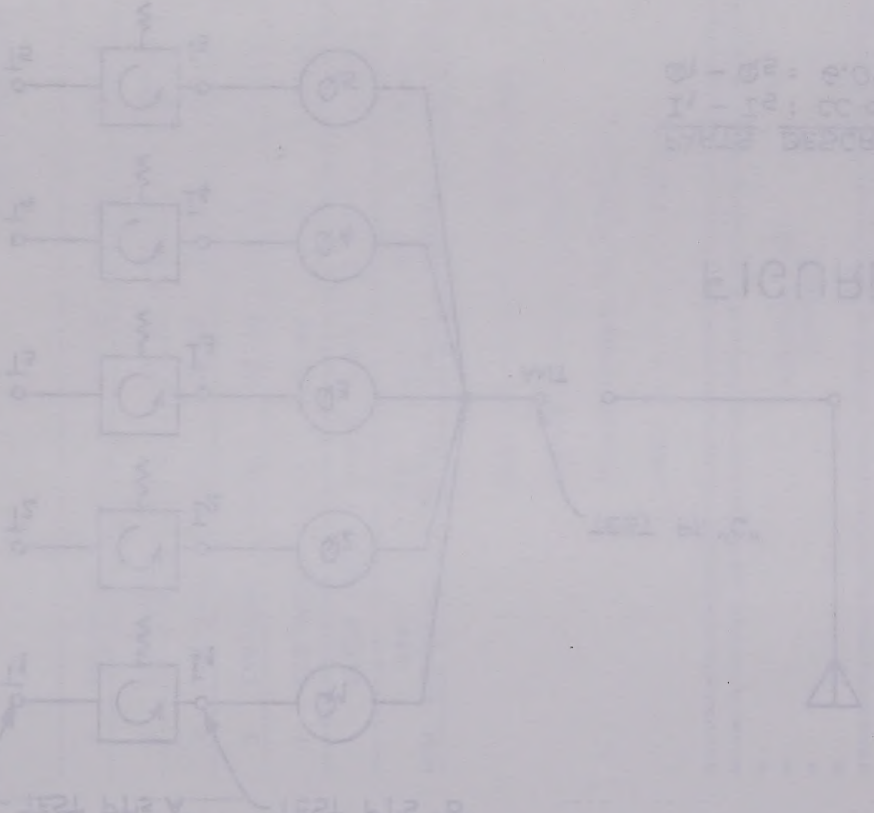
TITLE TJ SERIES COMBINER DIAGRAM

DRAWING NO. A-56743

DRAWN BY ANDRESEN | 10-19-84 | APPROVED BY PA | 11-19-86

CELWAVE R.F. INC.

MARLBORO, N.J. PHOENIX, AZ.



INSTRUCTIONS FOR 220 MHZ DUPLEXER
MANUAL NO. 74370

DESCRIPTION

The duplexer consists of twelve 6" PD1604B resonator cavities with an unloaded Q of about 7000. They are arranged with six cavities in each of the two frequency bands being combined. At a 600 KHz wide passband and a 400 KHz guardband used in the 220 MHz trunking range, the unit provides in excess of 75 dB isolation in either band. Insertion loss in each band is less than 2 dB. The graphs show the performance of the duplexer. Pass and reject adjustments are provided for all 12 cavities. The cables are of critical length. The loops also should not be adjusted.

TUNING

The unit is normally supplied tuned to the desired frequencies and no readjustments should be necessary unless there has been a change in frequency. A network analyzer is recommended for retuning. The reject, or notch frequency and pass frequency for each cavity have a preset separation. Cavity frequency adjustment alone should be necessary. The procedure for this is outlined as follows. Disconnect the cables between the cavities one at a time. Start at either the transmit or receive side with cavity #1 and continue through #6 (refer to the drawing). The notch order and frequency are important. The null frequency tolerance should be kept within +/- 2.5 KHz. The charts show the settings for each cavity. The pass / notch separation can also be checked at the same time. If the analyzer has a marker search function, it is helpful. Set channel 1 to search for maximum return loss and channel 2 for maximum reject. The difference between these null frequencies is the pass / notch separation. The values should agree with the tables. Reconnect each cavity after it is tuned. Repeat the procedure for both sides of the duplexer (refer to system outline). The response should be near that shown in the plots.

This manual includes drawing no(s): A-56898.

RX SECTION			TX SECTION		
CAVITY #	NOTCH FREQ. MHz	SEPARATION MHz	CAVITY #	NOTCH FREQ. MHz	SEPARATI MHz
1	220.01	1.10	1	221.01	.650
2	220.05	1.00	2	221.05	.750
3	220.32	.900	3	221.10	.850
4	220.53	.800	4	221.30	.950
5	220.54	.700	5	221.45	1.05
6	220.59	.600	6	221.60	1.15

REVISION	
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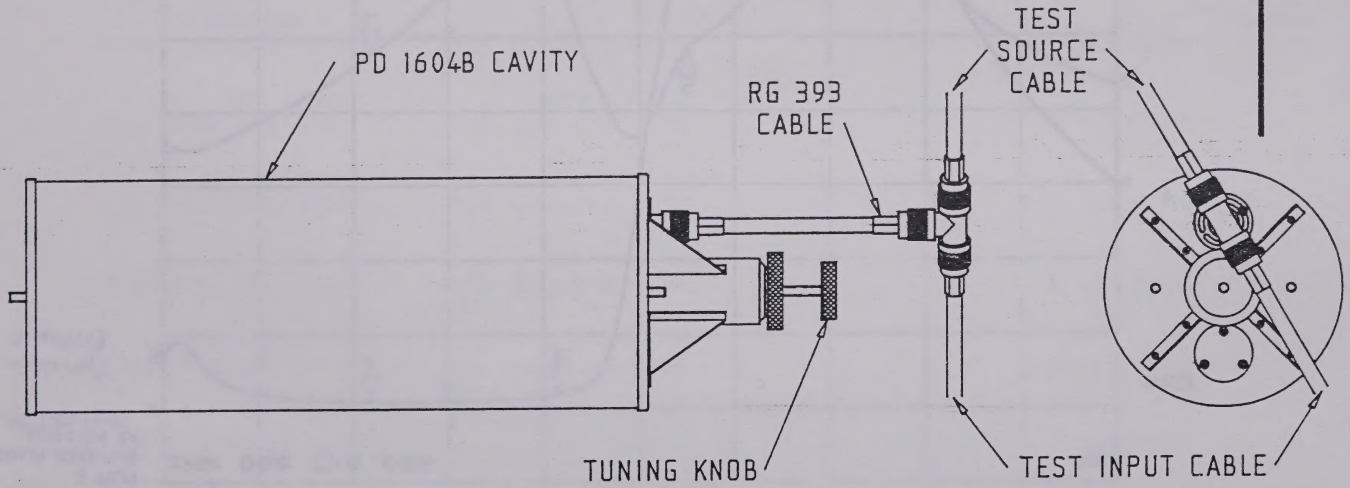

SCALE: 1/4" = 1"

Unless otherwise specified — All dimensions are in inches and title block tolerances apply. All thread dimensions to be met after plating where applicable and are to be gauge checked. Break all sharp edges .010-.015 after finish machining. All machined surfaces shall be smooth within 63 micro inches.

USED ON

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DIMENSIONAL TOLERANCES		
BASIC	FRACTIONAL	DECIMAL
0"- 1"	± .010	± .003
1"- 6"	± 1/64	± .005
6"- 24"	± 1/32	± .008
ALL ANGLES ± 1°		

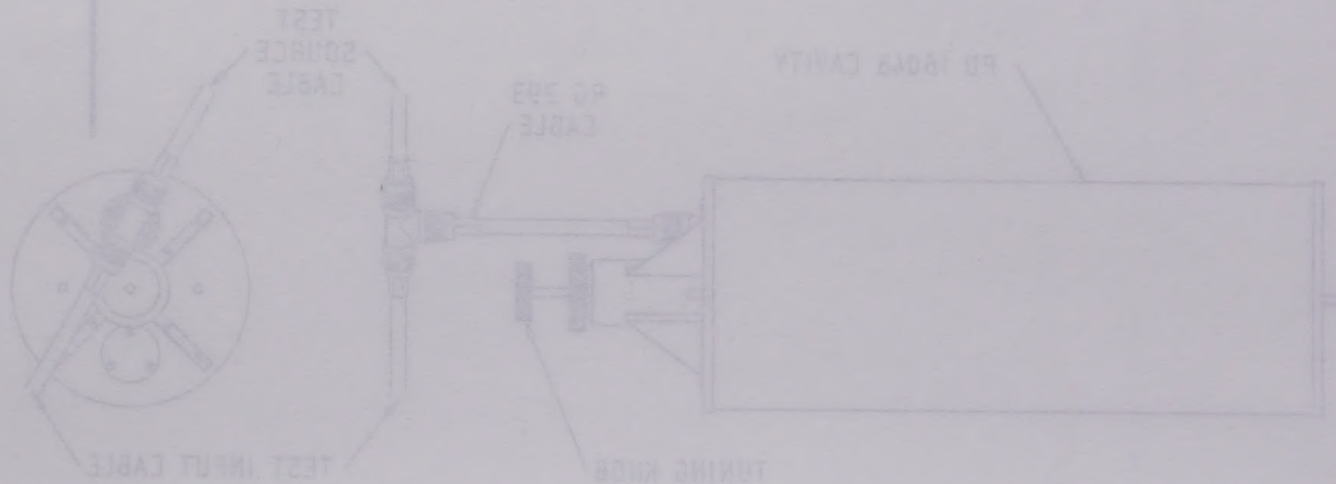
TITLE: 220 MHz PASS/REJECT CAVITY TEST SET-UP

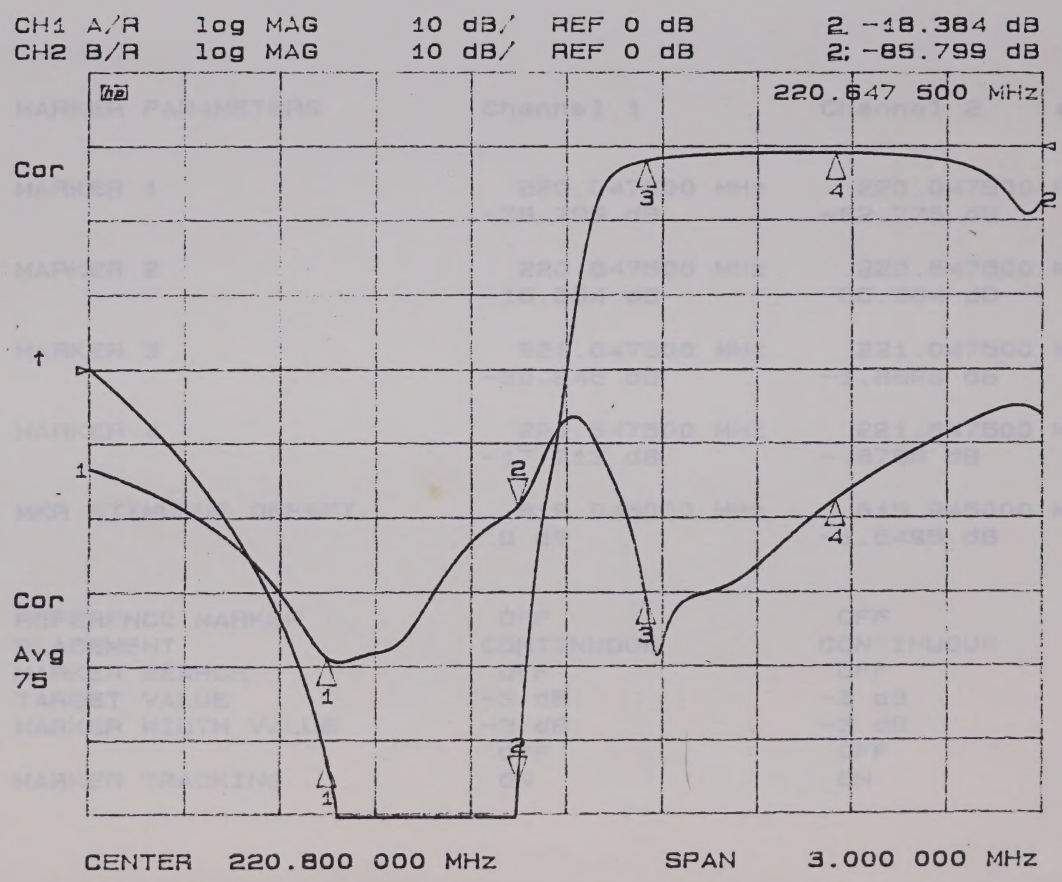
DRAWING NO. A- 56898

DRAWN BY	DATE	APPROVED BY	DATE
ANDRESEN	8-16-91	JM	8-16-91

CELWAVE R.F. INC.

MARLBORO, N.J. PHOENIX, AZ.


TEST
SOURCE
CABLE
TUNING KNOB

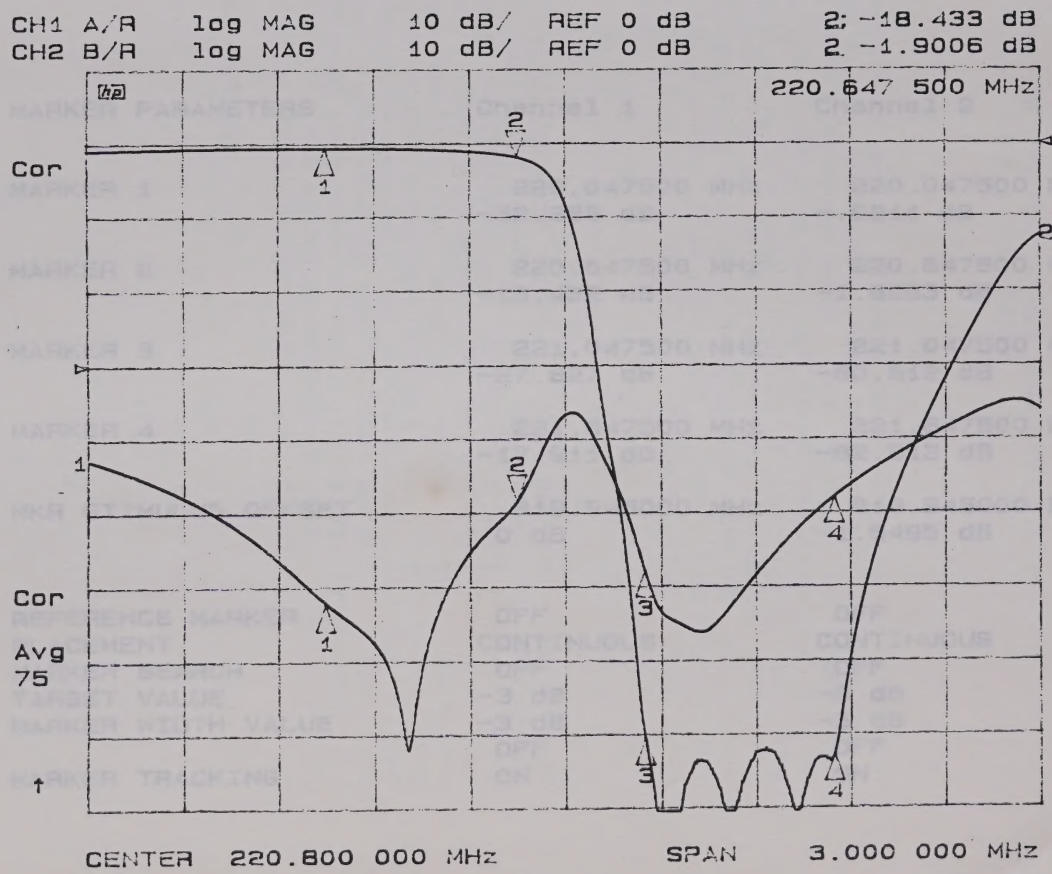

CH1 A/R log MAG 10 dB/ REF 0 dB 2 -18.384 dB
CH2 B/R log MAG 10 dB/ REF 0 dB 2: -85.799 dB
220.647 500 MHz
Cor
Cor
Avg
75
CENTER 220.800 000 MHz
SPAN 3.000 000 MHz

PLOT 5
DUPLEXER ALONE.
RX PASSBAND,
TX-REJECTION.

TYPICAL
RESPONSE

DATA FOR PLOT 5.

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	220.047500 MHz -38.799 dB	220.047500 MHz -82.776 dB
MARKER 2	220.647500 MHz -18.364 dB	220.647500 MHz -85.804 dB
MARKER 3	221.047500 MHz -30.945 dB	221.047500 MHz -1.8898 dB
MARKER 4	221.647500 MHz -17.713 dB	221.647500 MHz -.8766 dB
MKR STIMULUS OFFSET	819.945000 MHz 0 dB	819.945000 MHz -1.5495 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	ON	ON


CH1 A/R log MAG 10 dB/ REF 0 dB 2: -18.433 dB
CH2 B/R log MAG 10 dB/ REF 0 dB 2 -1.9006 dB
220.647 500 MHz
Cor
Cor
Avg
75
CENTER 220.800 000 MHz
SPAN 3.000 000 MHz

PLOT 4
DUPLEXER ALONE.
TX PASSBAND;
RX REJECTION.

TYPICAL
RESPONSE

DATA FOR PLOT 4.

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	220.047500 MHz -32.238 dB	220.047500 MHz -.6211 dB
MARKER 2	220.647500 MHz -18.432 dB	220.647500 MHz -1.8983 dB
MARKER 3	221.047500 MHz -27.827 dB	221.047500 MHz -80.612 dB
MARKER 4	221.647500 MHz -17.911 dB	221.647500 MHz -82.613 dB
MKR STIMULUS OFFSET	819.945000 MHz 0 dB	819.945000 MHz -1.5495 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	ON	ON

INSTRUCTIONS FOR 220 MHz 2-POLE BANDPASS FILTER
MANUAL NO. 74369

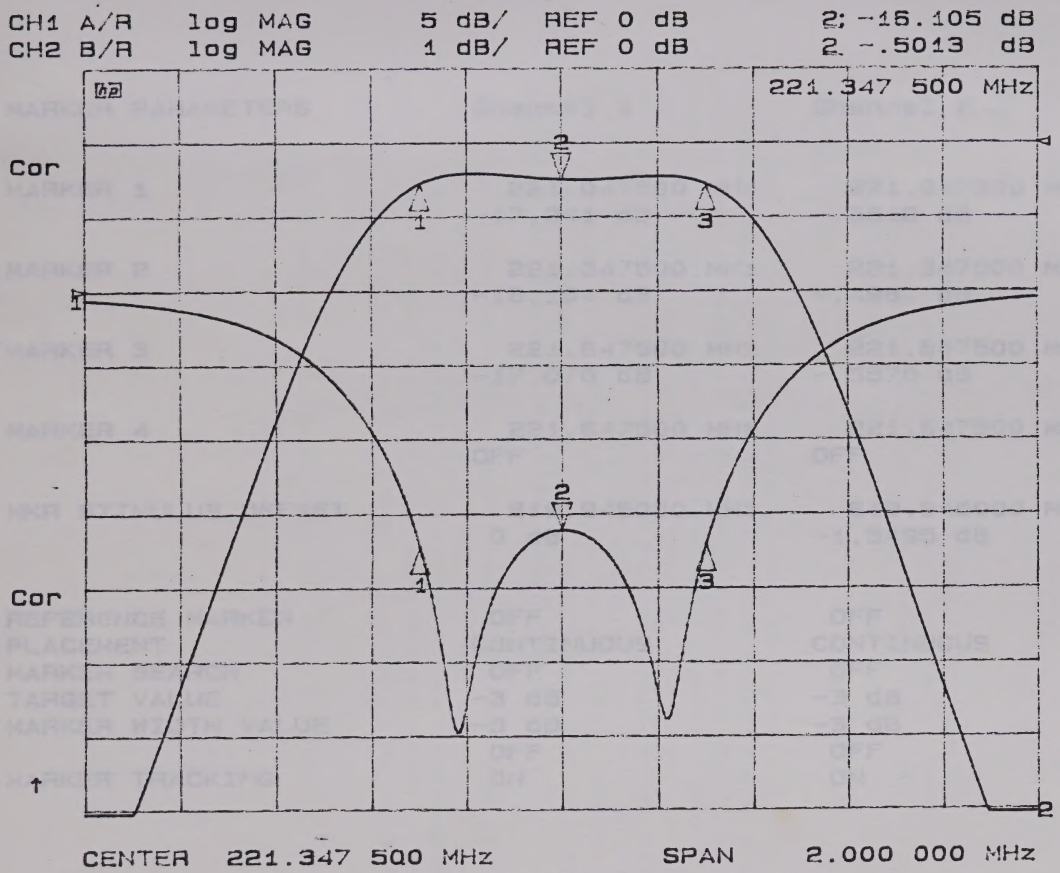
DESCRIPTION

This filter consists of two 6" PD1604B cavities with an unloaded Q of about 7000. The 2-pole bandpass filter is intended for use as a preselector in the 220 MHz TRUNKING BAND. The filter is tuned for 221-221.6 MHz. Insertion loss averages .65 dB on the ends and .50 dB in the middle. Return loss is greater than 14 dB and ripple is less than 0.1 dB. The selectivity of the filter yields a sharp drop to reject the Channel 13 picture carrier frequency at 221.25 MHz. The attenuation is near 48 dB down from maximum filter response. The cable between the cavities is of critical length. The loops also should not be adjusted.

TUNING

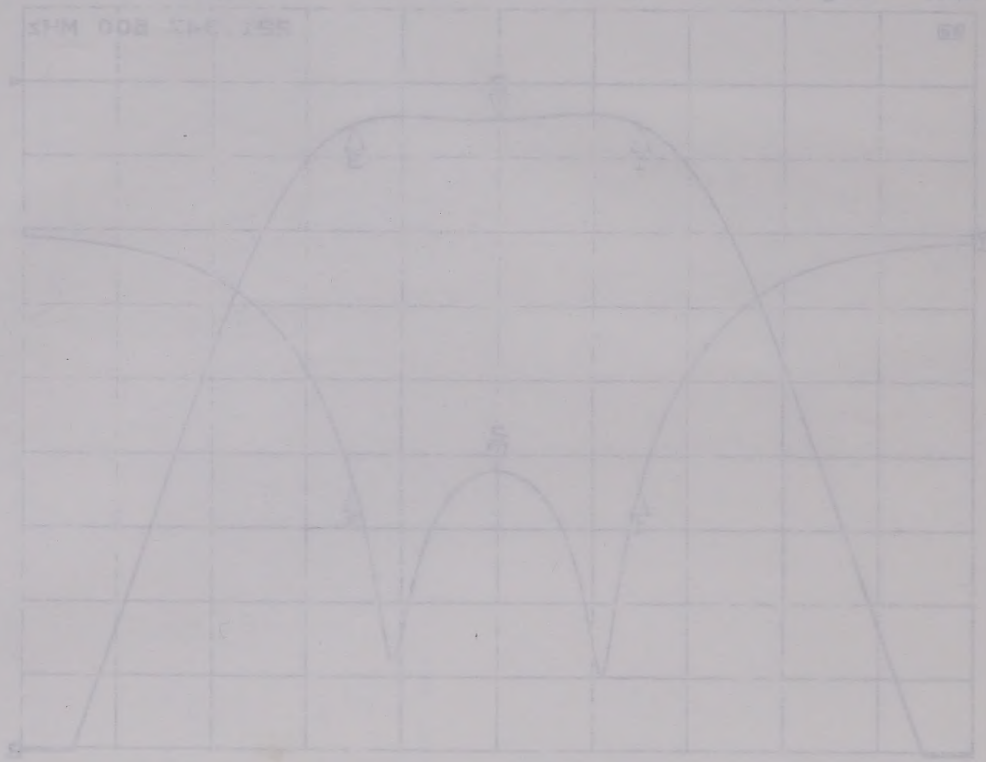
The unit is normally supplied tuned to the desired frequencies and no readjustments should be required. If retuning is necessary, then a network analyzer is recommended. Disconnect both cables going to the 2-pole filter. One connects the filter to the receiver multicoupler and the other to the receiver side of the duplexer. Leave the interconnecting cable between the cavities in place. The bridge or source cable from the analyzer is connected to the filter input and the analyzer input lead to the filter output. Tune each cavity until the response is symmetric about the center frequency. A balanced insertion loss on the edges accomplishes this. The cabling can now be reconnected between the duplexer and the RMC.

This manual includes the plots.


CH1 A/R log MAG 5 dB/ REF 0 dB 2: -16.105 dB
CH2 B/R log MAG 1 dB/ REF 0 dB 2 -.5013 dB
221.347 500 MHz
Cor
Cor
CENTER 221.347 500 MHz
SPAN 2.000 000 MHz

PLOT7
2-POLE FILTER

TYPICAL RESPONSE



MARKER PARAMETERS	Channel 1	Channel 2	
MARKER 1	221.047500 MHz -17.241 dB	221.047500 MHz -.5518 dB	DATA FOR PLOT 7
MARKER 2	221.347500 MHz -16.104 dB	221.347500 MHz -.4987 dB	
MARKER 3	221.647500 MHz -17.076 dB	221.647500 MHz -.5570 dB	
MARKER 4	221.647500 MHz OFF	221.647500 MHz OFF	
MKR STIMULUS OFFSET	819.945000 MHz 0 dB	819.945000 MHz -1.5495 dB	
REFERENCE MARKER	OFF	OFF	
PLACEMENT	CONTINUOUS	CONTINUOUS	
MARKER SEARCH	OFF	OFF	
TARGET VALUE	-3 dB	-3 dB	
MARKER WIDTH VALUE	-3 dB	-3 dB	
	OFF	OFF	
MARKER TRACKING	ON	ON	

INSTRUCTION MANUAL FOR 220 MHZ RECEIVER MULTICOUPLER
MANUAL NO 74371

DESCRIPTION

The receiver multicoupler is intended for use in the 221-221.6 MHz band for up to eight receivers. A block diagram of the multicoupler is shown in drawing B-73761.

The single stage amplifier has a gain of 16.5 dB, a noise figure of 3.4 dB, and a third order intercept point of 37 dB. The eight-way divider has a loss of 10 dB. The gain of the amplifier plus divider, including cable is 6.2 dB.

TESTING

The power supply is a 110 VAC input with a regulated 20 VDC output to the amplifier. The RMC has been tested to specifications and no adjustments are required. Make sure all unused power divider ports are terminated with 50 ohm loads.

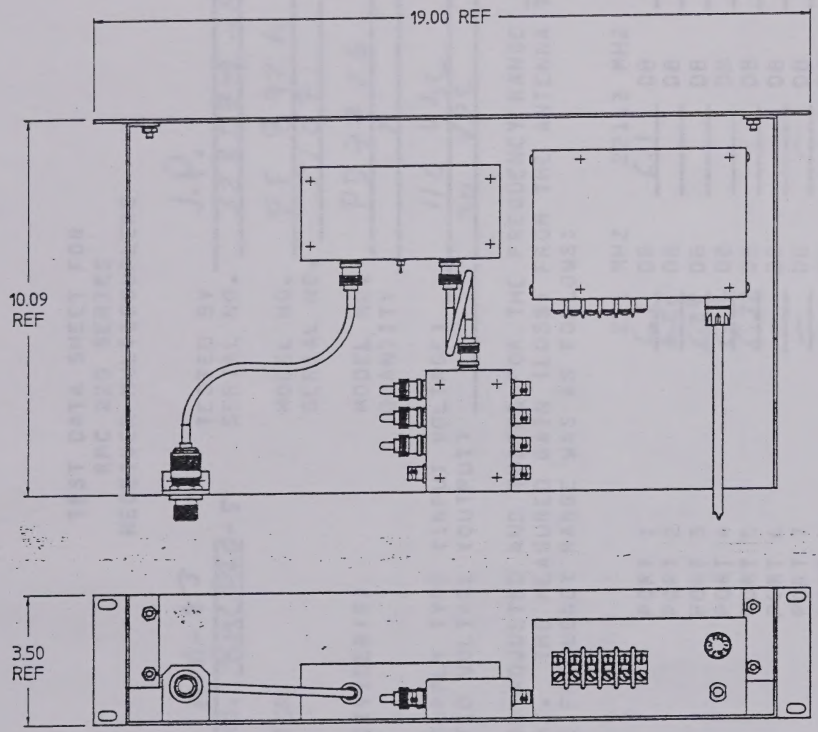
MAINTENANCE

The PD multicoupler series provides a highly reliable, maintenance free system device. The solid state amplifier is the only active device present and should have an indefinite use life. Every effort has been made in the multicoupler design to protect the amplifier from influences of high or low line voltage, spikes, etc. It is possible, however, that extreme conditions can cause a failure. Among these are the potential damages due to lightning strike, extreme line voltage levels of short or long duration or the remote possibility of more than four watts of R.F. power being applied directly to the multicoupler input terminal.

Celwave stocks amplifiers and will respond readily to provide a replacement should an amplifier failure occur. For systems requiring full time, high priority operation, we recommend that one spare amplifier is held in priority maintenance stock. It can be exchanged in the multicoupler in a matter of minutes to restore all receivers to operation.

This manual includes drawing no(s): B-73761.

REVISION	
0	
1	KAA 3-19-93 MODIFIED SPECIFICATIONS JM



SCALE: 3/8" = 1"

SPECIFICATIONS

FREQUENCY RANGE (TYP)	221.0 - 221.6 MHz
DIVIDER LOSS (NORMAL)	10 dB
AMPLIFIER RANGE (PF892A)	175 - 225 MHz
AMPLIFIER NOISE FIGURE	3.4 dB @ 200 MHz
INPUT VSWR (MAX)	1.1 dB @ 175 MHz
OUTPUT VSWR (MAX)	1.1 dB @ 175 MHz
3RD ORDER INTERCEPT PT	+36.9 dBM
INPUT FREQUENCY	195 & 205 MHz
OUTPUT FREQUENCY	215 MHz
DC VOLTAGE	20.0 V @ 173 mA

USED ON

PROPRIETARY NOTE: "THE INFORMATION CONTAINED ON THIS DOCUMENT IS CONSIDERED TO BE CONFIDENTIAL MATERIAL, PROPRIETARY TO CELWAVE AND IS PROVIDED SOLELY FOR INFORMATION PURPOSES. THIS INFORMATION SHALL NOT BE USED BY ANYONE OTHER THAN CELWAVE TO DESIGN OR CONSTRUCT ANY OF THE ITEMS DEPICTED, NOR SHALL IT BE DISCLOSED, DUPLICATED OR COPIED FOR ANY PURPOSE, NOR MADE AVAILABLE TO ANY THIRD PARTY WITHOUT THE PRIOR WRITTEN CONSENT OF A CELWAVE OFFICIAL."

Unless otherwise specified –

All dimensions are in inches and title block tolerances apply.

All thread dimensions to be met after plating where applicable and are to be gauge checked. Break all sharp edges .010-.015 after finish machining.

All machined surfaces shall be smooth within 63 micro inches.

DIMENSIONAL TOLERANCES		
BASIC	FRACTIONAL	DECIMAL
0"- 1"	± 1/64	± .010
1"- 6"	± 1/64	± .005
6"- 24"	± 1/32	± .005
ALL ANGLES ± 1°		

TITLE: RMC220-8 Rx MULTICOUPLER ASS'Y

DRAWING NO. B- 73761

DRAWN BY ANDERSON 8-30-94 APPROVED BY JM 8-30-94

CELWAVE DIVISION OF RADIO FREQUENCY SYSTEMS

MARLBORO, N.J. PHOENIX, AZ.

TEST DATA SHEET FOR
RMC 220 SERIES
RECEIVER MULTICOUPLERS

DATE 11-11-93 TESTED BY J.P.
MODEL NO. RMC220-5 SERIAL NO. 328574-A

AMPLIFIER MODEL NO. PF 892A
SERIAL NO. 51071

POWER DIVIDER(S) MODEL NO. PD7726
QUANTITY 1

POWER SUPPLY TYPE (INPUT VOLTAGE) 110 VAC
REGULATED VOLTAGE (OUTPUT) 20 VDC

THIS UNIT WAS ADJUSTED AND TESTED FOR THE FREQUENCY RANGE 221.0175 TO 221.6475 MHZ. THE MEASURED GAIN (LOSS) FROM THE ANTENNA TERMINAL OF THE ADJUSTED FREQUENCY RANGE WAS AS FOLLOWS:

DIVIDER NO. 1	221 MHZ	221.3 MHZ	221.6 MHZ
PORT 1	6.1 DB	6.1 DB	6.1 DB
PORT 2	6.21 DB	____ DB	____ DB
PORT 3	6.27 DB	____ DB	____ DB
PORT 4	6.32 DB	____ DB	____ DB
PORT 5	6.22 DB	____ DB	____ DB
PORT 6	____ DB	____ DB	____ DB
PORT 7	____ DB	____ DB	____ DB
PORT 8	____ DB	____ DB	____ DB

AMPLIFIER GAIN (ALONE)	175 MHZ	200 MHZ	225 MHZ
	16.6 DB	16.5 DB	16.3 DB

AMPLIFIER GAIN (AMPLIFIER AND DIVIDER)	175 MHZ	200 MHZ	225 MHZ
	6.6 DB	6.42 DB	6.27 DB

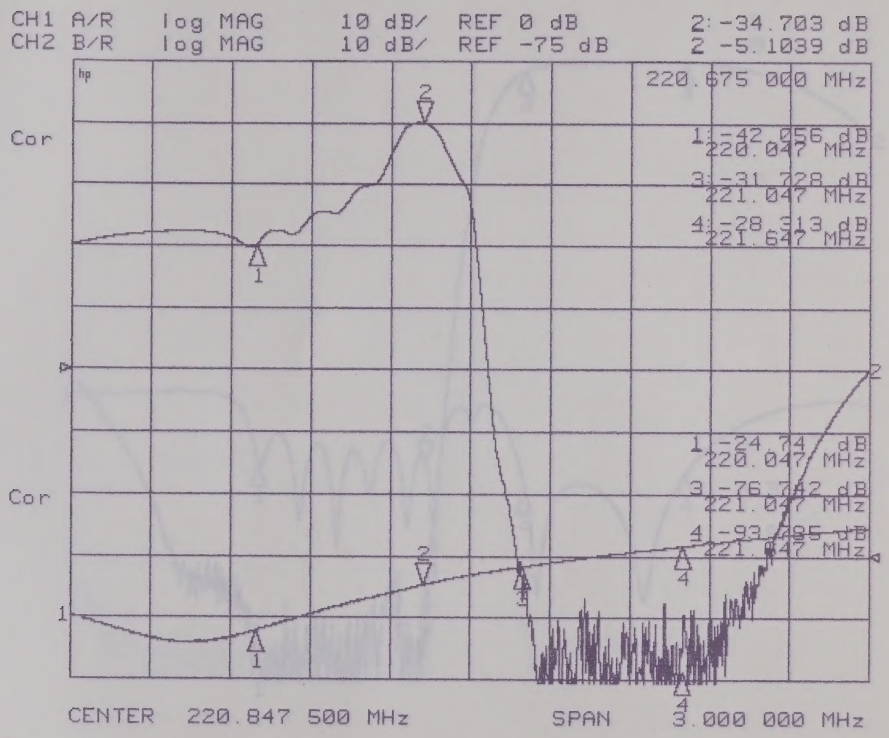
RETURN LOSS	221 MHZ	221.3 MHZ	221.6 MHZ
	6.3 DB	6.3 DB	6.3 DB

+++ TEST DATA PF SERIES AMPLIFIERS +++

MODEL PF892A SERIAL # 051071
FREQUENCY BAND: 175 TO 225 MHz
Date 09-14-1993 Inspected by: LC Approved by: RF

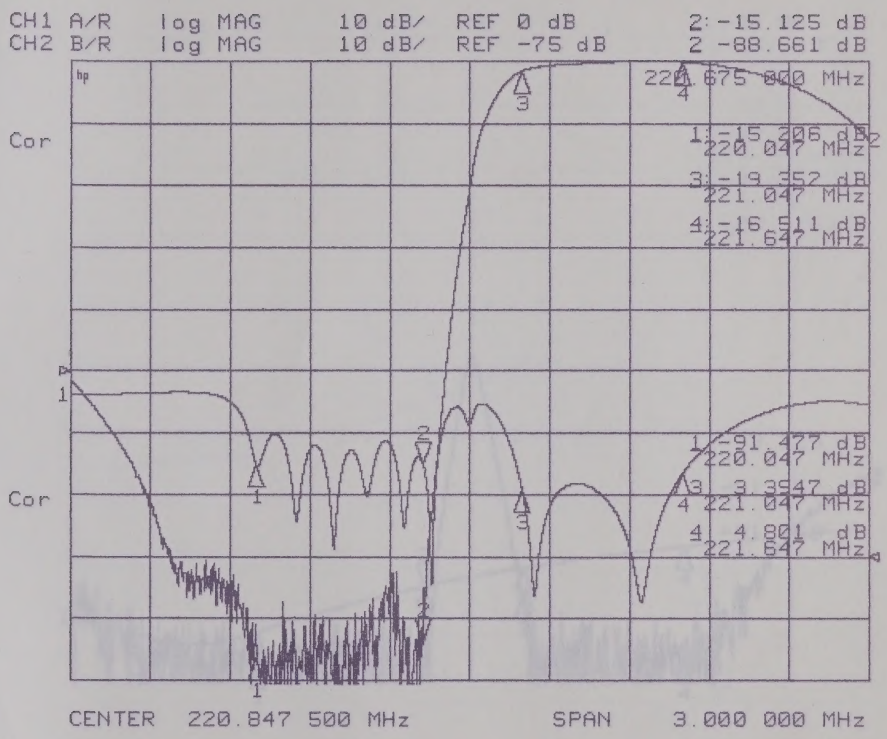
GAIN = 16.5 dB at 175 MHz
GAIN = 16.35 dB at 225 MHz
Highest VSWR in Band:
Input 1.08 at 225 Mhz
Output 1.05 at 175 Mhz
Noise Figure 4.3dB at 200 Mhz
3rd Intercept Pt. 37.5 dBm
Input Freqs: 210 Mhz and 200 Mhz, Output Freq: 190 Mhz
DC Current: 171 ma. at 20 volts

CELWAVE
33890 Eastgate Circle
Corvallis, OR 97333



WORST CASE OF INSERTION LOSS
BRIDGE CABLE AT CHANNEL 5 INPUT
OTHER CABLE AT ANTENNA

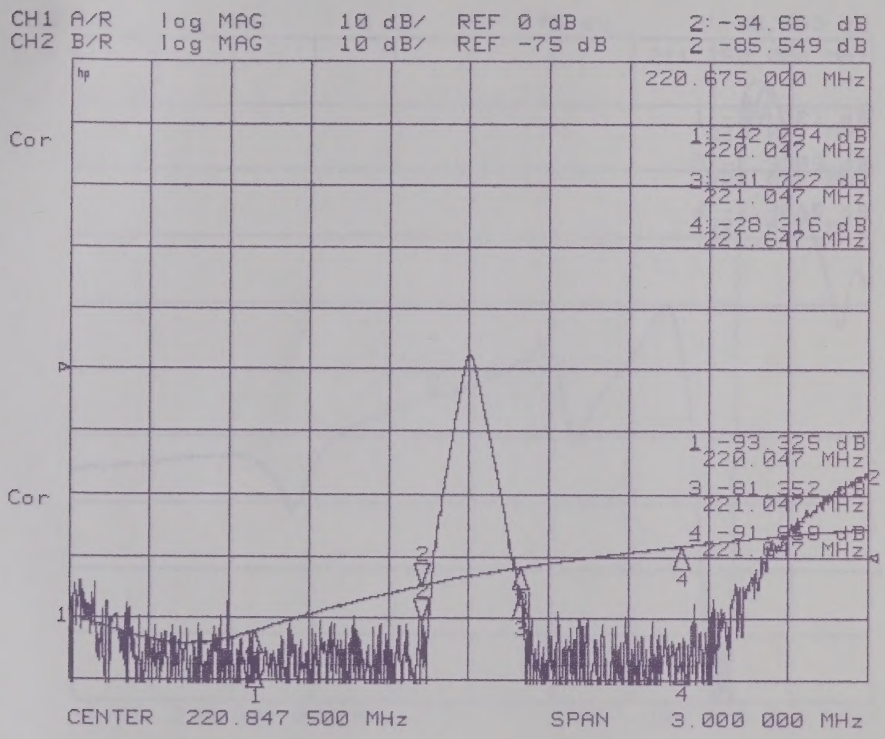
CH1 A/R log MAG 10 dB/ REF 0 dB 2: -34.703 dB
CH2 B/R log MAG 10 dB/ REF -75 dB 2: -5.1039 dB
CENTER 220.847 500 MHz
SPAN 3 000 000 MHz



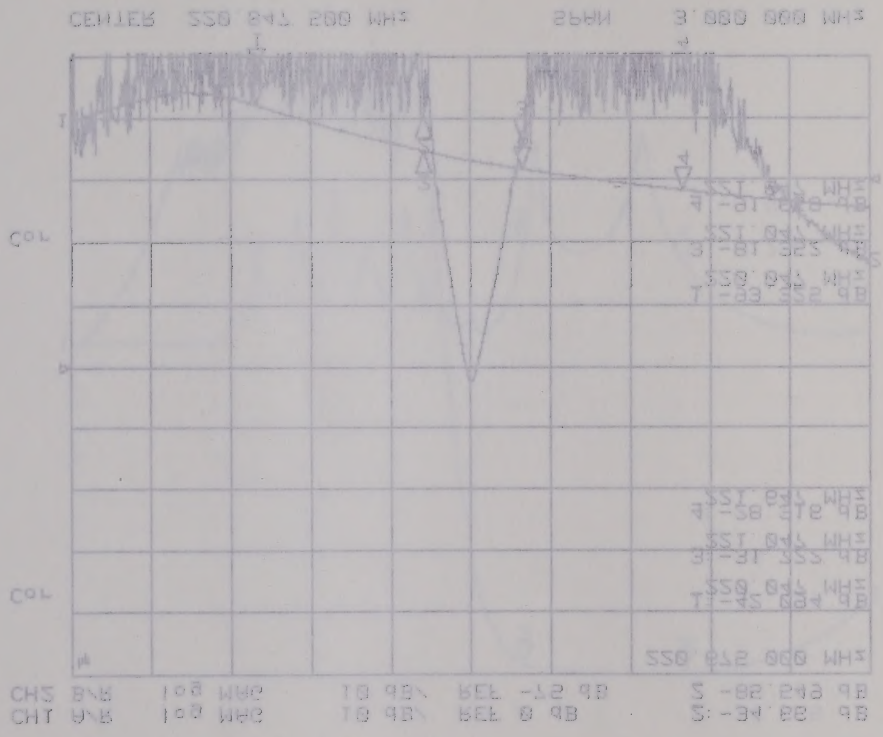
SYSTEM GAIN

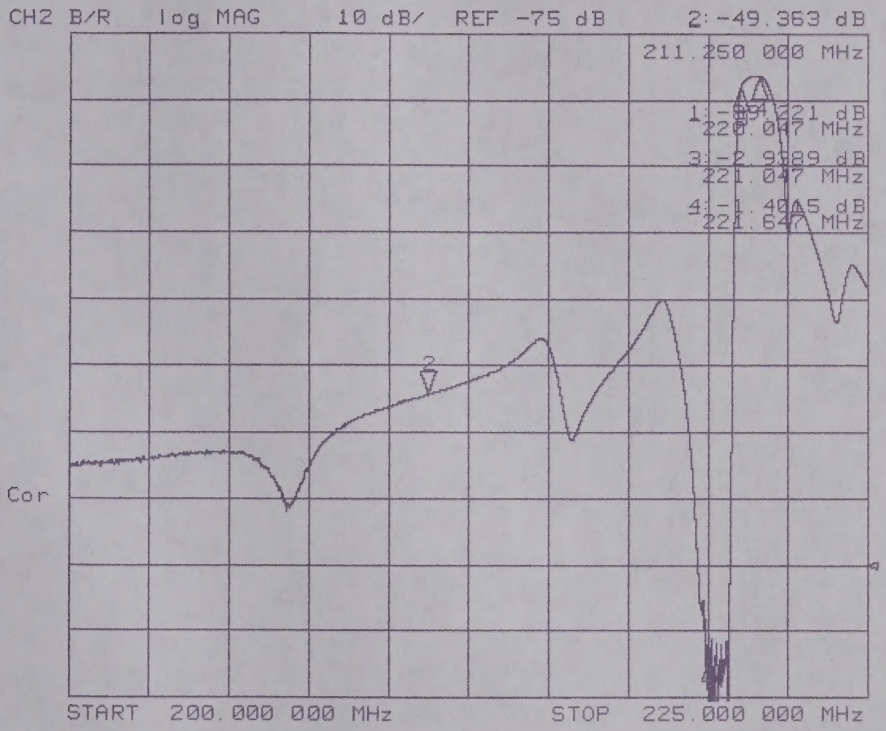
ANTENNA RETURN LOSS AT RX AND TX BAND

CH1 A/R log MAG 10 dB/ REF 0 dB
CH2 B/R log MAG 10 dB/ REF -75 dB
CENTER 220 847 500 MHz
SPAN 3.000 000 MHz



TX ATTENUATION LESS RMC; TX TO 2-POLE FILTER RESPONSE





ATTANUATION AT 211.25 MHz
BRIDGE CABLE AT ANTENNA AND THE OTHER CABLE
ON OUTPUT OF 2-POLE FILTER